

## Claims

## 1. A radio communication method comprising:

a step in which when a first radio communication device detects a beacon of another network in a beacon transmission period used in the network to which the device belongs, it transmits a beacon performing a collision notification which gives notice of a collision of the beacon and gives notice that the beacon transmission period of the network to which the device belongs is moved to a new time slot excluding the beacon transmission time slot of the other network;

a step in which when a second radio communication device which belongs to the same network as the first radio communication device receives the collision notification from the first radio communication device, the second radio communication device relays and transmits the collision notification;

a step in which when a third radio communication device which belongs to the same network as the first radio communication device and the second radio communication device receives a collision notification from the second radio communication device, the third radio communication device also relays and transmits the collision notification;

a step in which the first radio communication device transmits a beacon after moving the beacon transmission period to the new time slot;

a step in which when the second radio communication device receives the beacon from the first radio communication device,

the second radio communication device transmits a beacon in the new beacon transmission period from that time onward; and

a step in which when the third radio communication device receives the beacon from the second radio communication device, transmits a beacon in the new beacon transmission period from that time onward.

2. The radio communication method according to claim 1, wherein the first radio communication device also includes a lifetime of the notification in the collision notification and transmits a beacon at the new time slot within the lifetime, and

wherein the second radio communication device and the third radio communication device stop relaying the collision notification when the notified lifetime has expired.

3. The radio communication method according to claim 2, wherein the first radio communication device also includes a device ID for identifying itself in the collision notification, and

wherein when the second radio communication device and the third radio communication device receive collision notifications whose device IDs are the same, they give preference to the notification whose lifetime is larger.

4. The radio communication method according to claim 3, wherein when the second radio communication device and the third radio communication device receive collision notifications whose device IDs are different, they give precedence to the collision notification having either the

maximum device ID or the minimum device ID among the device IDs, which are previously prescribed in their network.

5. The radio communication method according to claim 1, wherein communication is prohibited in the first radio communication device, the second radio communication device and the third radio communication device during the time from transmission or reception of the collision notification until the reception of a beacon of a transmission destination radio communication device at the new time slot.

6. The radio communication method according to claim 1, also comprising:

a step in which the first radio communication device transmits a beacon for performing a collision cancellation notification which gives notice that the beacon collision has been cancelled when the device does not detect a beacon of another network throughout a predetermined period of time in the beacon transmission period of the network to which the device belongs after the collision notification; and

a step in which when the second radio communication device and the third radio communication device receive a collision cancellation notification, they stop moving to the new time slot in the beacon transmission period and relay and transmit the collision cancellation notification.

7. The radio communication method according to claim 6, wherein the first radio communication device also includes a lifetime of the collision cancellation notification in the collision cancellation notification, and

wherein the second radio communication device and the third radio communication device end the relay when the lifetime has expired.

8. The radio communication method according to claim 7, wherein the first radio communication device also includes a device ID for identifying itself in the collision cancellation notification, and

wherein when the second radio communication device and the third radio communication device receive a collision cancellation notification whose device ID is the same, they delete the setting of the lifetime which has been given by collision notification in the case where the lifetime of the collision cancellation notification is larger than the lifetime of the collision notification.

9. The radio communication method according to claim 8, wherein if after the second radio communication device and the third radio communication device receive a collision cancellation notification, they receive a collision notification whose device ID is the same, they delete the setting of the lifetime given in the collision cancellation notification in the where the lifetime of the collision notification is larger than the lifetime of the collision cancellation notification.

10. The radio communication method according to claim 1, also comprising:

a step in which when the first radio communication device detects a beacon of another network outside of the beacon transmission period used by the network to which the device

belongs, it transmits a beacon for performing a beacon period notification which gives notice of the detected beacon transmission period;

a step in which when the second radio communication device receives the beacon period notification from the first radio communication device, the second radio communication device relays and transmits the beacon period notification; and

a step in which when the third radio communication device receives the beacon period notification from the second radio communication device, the third radio communication device also relays and transmits the beacon period notification.

11. The radio communication method according to claim 10,

wherein when the first radio communication device performs the collision notification, it deems a time slot from which the beacon transmission period given in the beacon period notification from another radio communication device belonging the same network is removed as the new time slot to which the first radio communication device will move the beacon transmission period.

12. The radio communication method according to claim 10,

wherein the second radio communication device also includes a lifetime of the notification in the beacon period notification, and

wherein the third radio communication device stops relaying the beacon period notification when the lifetime of the beacon period notification has expired.

13. The radio communication device according to claim 12,

wherein the second radio communication device also includes a device ID for identifying itself in the beacon period notification, and

wherein when the third radio communication device receives the beacon period notifications whose device IDs are the same, it gives precedence to the notification whose lifetime of the beacon period notification is larger, and when it receives beacon period notifications whose device IDs are different, the device gives precedence to the beacon period notification having either the maximum ID or the minimum ID among the device IDs, which were previously prescribed in its network.

14. The radio communication method according to claim 10, also comprising:

a step in which if after the second radio communication device receives the beacon period notification, it does not detect a beacon period notification throughout a predetermined period of time, it transmits a beacon for performing a beacon period discard notification for instructing the discard of the beacon period notification, and

a step in which when the third radio communication device receives the beacon period discard notification, it relays and transmits the beacon period discard notification.

15. The radio communication method according to claim 14,

wherein the second radio communication device also includes a lifetime of the notification in the beacon period discard notification, and

wherein the third radio communication device stops

relaying the beacon period discard notification when the lifetime of the beacon period discard notification has expired.

16. The radio communication method according to claim 15, wherein the second radio communication device also includes a device ID for identifying the first radio communication device in the beacon period discard notification, and

wherein when the third radio communication device receives beacon period discard notifications whose device IDs are the same, it gives precedence to the notification whose lifetime of the beacon period discard notification is larger, and when it receives beacon period discard notifications whose device IDs are different, it gives precedence to the beacon period discard notification having either maximum device ID or the minimum device ID among the device IDs, which were previously prescribed in its network.

17. The radio communication method according to claim 16, wherein the third radio communication device gives precedence to the notification whose lifetime is larger when the device ID of the transmission destination of the received notification is the same.

18. A radio communication device, comprising:  
a beacon reception unit receiving a beacon and extracting a frame;

a frame judgment unit judging whether the extracted frame is one requiring data transmission/reception or one giving notice of a collision with a beacon of another network;

a frame constructing unit used when said frame judgment unit has judged that the frame is a collision notification, generating a collision notification frame for relaying the collision notification; and

a beacon transmission instruction unit instructing transmission of the collision notification frame at the beacon transmission timing.

19. The radio communication device according to claim 18, wherein the collision notification frame includes information which prescribes a new time slot other than a beacon transmission period of another network as the beacon transmission period, and

wherein , when said beacon transmission instruction unit receives a beacon detection notification from its network at the new time slot through said beacon reception unit, the beacon transmission instruction unit switches the beacon transmission timing to the new time slot.

20. The radio communication device according to claim 19, wherein the collision notification frame also includes lifetime information of the collision notification, and

wherein said frame constructing unit counts the lifetime every time it receives the beacon transmission instruction from said beacon transmission instruction unit and generates the collision notification frame until the expiration of the lifetime.

21. The radio communication device according to claim 20, wherein the collision notification frame also includes



a device ID for identifying the radio communication device which has transmitted the collision notification frame, and

wherein when said frame judgment unit receives collision notification frames whose device IDs are the same, it gives precedence to the frame whose lifetime is larger.

22. The radio communication device according to claim 21,

wherein when said frame judgment unit receives collision notifications whose device IDs are different, it gives precedence to the collision notification having either the maximum ID or the minimum ID among the device IDs, which are previously prescribed in its network.

23. The radio communication device according to claim 22,

wherein said frame constructing unit does not generate a frame of data communication from the time when said frame judgment unit transmits or receives the collision notification until said beacon reception unit receives a beacon of the transmission destination radio communication device at the new time slot.

24. The radio communication device according to claim 23, also comprising:

a recording unit recording the collision notification, and

wherein when said frame constructing unit receives a collision cancellation notification for giving notice that the collision has been cancelled from said frame judgment unit, the frame constructing unit discards the record of the collision notification and generates a frame for relaying the collision

cancellation notification.

25. The radio communication device according to claim 24, wherein the frame of the collision cancellation notification also includes lifetime information of the collision cancellation notification, and

wherein said frame constructing unit counts the lifetime every time it receives the beacon transmission instruction from said beacon transmission instruction unit, and generates the frame of the collision cancellation notification until the expiration of the lifetime.

26. The radio communication device according to claim 25, wherein the frame of the collision cancellation notification also includes a device ID for identifying the device, and

wherein when said frame constructing unit receives a collision cancellation notification whose device ID is the same, it discards the record of the collision notification in the case where the lifetime of the collision notification is larger than the lifetime of the collision cancellation notification.

27. The radio communication device according to claim 26, wherein when said frame constructing unit receives the collision cancellation notification, it records the collision cancellation notification in said recording unit, and when it receives the collision notification frame including the same device ID during the transmission of the frame including the collision cancellation notification in the lifetime, it discards the record of the collision cancellation notification

in the case where the lifetime of the collision notification is larger than the lifetime of the collision cancellation notification.

28. The radio communication device according to claim 24, wherein when said frame judgment unit receives information of a beacon transmission period of another network which does not overlap its own beacon transmission period, it records the beacon transmission period in said recording unit, and

wherein when said frame constructing unit detects a beacon transmission period of another network which overlaps with its own beacon transmission period, the frame constructing unit generates a collision notification frame including information which sets a new time slot from which the beacon transmission period of another network and beacon transmission periods of other networks recorded in said recording unit are removed as the beacon transmission period of its network.

29. The radio communication method according to claim 1, wherein the first to the third radio communication device transmit a beacon including a network ID for identifying the radio network to which the device belongs, and

wherein when they receive a beacon including a beacon transmission period which overlaps with their beacon transmission period, the radio communication device having the network ID chosen according to a previously prescribed rule deciding between the two in the case where the network ID of the beacon is larger and in the case where the network ID of

the beacon is smaller than its own network ID, performs the collision notification.